ATOMIC ENERGY newsletter

THE FIRST AND ONLY ATOMIC [illegible] SERVICE

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Dear Sir:

The first controlled nuclear explosions in this country in nearly 6 years occurred last week at the USAEC's new testing ground in southwestern Nevada. The proving ground, which supplements Eniwetok Atoll, in the central Pacific, is on a portion of the USAF's 5,000 acre bombing and gunnery range (AEN:1/16/51, p.1.).

A new production works for the atomic energy program will be set up by the USAEC at the Pantex Ordnance Works, some 17 miles southeast of Amarillo, Texas. About 4,000 acres of the reservation will be used; a certain amount of new construction will be done. Now, under a contract negotiated by the USAEC with the Silas Mason Co., New York, that firm will do architect-engineer work; active construction work will begin shortly. Upon completion, an industrial concern will operate the facility under a cost-plus-fixed-fee contract. Eventually, 1,000 persons will be employed to operate the facility.

The Detroit Edison Co., and Dow Chemical Co., acting together, have made a proposal to the USAEC under which they would study the feasibility of developing and operating nuclear reactors for the production of plutonium, with electrical power as the ultimate goal. Monsanto Chemical Co., who have also made such a proposal (AEN:6/20/50, p.1), had suggested that a private syndicate, or pair of industries, might participate in nuclear power development by sharing costs of design, construction and operation of a nuclear reactor. The uranium for the reactor would be loaned by the Government; the radioisotopes, fissionable by-products, and plutonium produced, would revert to the government, and would provide one source of income for the operating company. Main income, however, would be the electrical power, from the reactor's heat. Further proposals along these lines from industrial concerns or groups, should include (the USAEC has suggested), objectives of the proposed study, and should be made by those financially responsible and adequately staffed. However, the USAEC will make no commitments now beyond the study phase of such an undertaking.

The USAEC has set $1,277,000,000.00 as the amount it will need for fiscal 1952 (June 30,1951-July 1,1952). The budget, submitted by President Truman in his regular budget message to Congress, in the last fortnight, will be used to (1) expand production at existing facilities, and construct new plants, (2) accelerate work on development of new and improved atomic weapons, (3) continue at a rapid pace the nuclear reactor program, and (4) intensify nuclear research activities.

In a series of personnel changes in the USAEC's Washington staff, Walter J. Williams was made deputy general manager (he had been director of production), and R. W. Cook became director of production. The promotions resulted from the vacancy created in the position of deputy general manager by the resignation last week of Carleton Shugg. Shugg will become assistant general manager of the Electric Boat Co.'s Groton, Conn., plant.

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NUCLEAR ENERGY TECHNIQUES IMPORTANT TO INDUSTRY: A Special Report, for readers of this LETTER, on the results of a survey at the electromagnetic plant, Y-12, at Oak Ridge, Tenn., by representatives of American Society for Metals; Institute of Radio Engineers; American Society of Mechanical Engineers; and American Institute of Chemical Engineers.

Techniques of importance to industry, shown through (1) an examination of documents in the patent department, and (2) examination of the Y-12 plant, with related documents, have now been reported upon by engineering society representatives (as above). These are the first two phases completed under the test program to sample one complete integrated nuclear energy project to determine quantity and quality of the technological information that could be declassified to the advantage of American industry.

The survey turned up much that may be noteworthy in chemical engineering and metallurgy; little that is of prime interest to the fields of mechanical and electrical engineering:

CHEMICAL ENGINEERING- The whole technique of electromagnetic separation is new and of great interest to industrial operations. Methods for separating rare metals could be carefully studied by industry. Data on ion exchange of the rare earths, on use of oxygen to supplement air feed to an incinerator unit, and on vacuum technology, are examples of subjects of value to the chemical engineer in industry. Certain control techniques, safety measures, and other novel developments presumably could be described in the literature. It is expected that further search will disclose other valuable information.

METALLURGY- Many reports now classified contain summaries of corrosion and erosion data, and miscellaneous metallurgical data. Should a volume devoted to metallurgy be a practical avenue of publication of such data (after its declassification), it should cover current work, rather than history, and should be devoted to refining, alloying, fabricating, and the mechanical and chemical properties of a group of relatively rare metals. Concerning the plant apparatus and construction, there did not appear to be any important information withheld.

ELECTRICAL- Establishing and controlling the electrostatic and magnetic fields of the calutron does not differ, basically, from creating the same fields for other applications. However, certain electronic circuits, apparatus details, and technical ingenuity are eminently publishable, if declassifiable; the staff should be encouraged to seek declassification, for publication, of those of greatest interest.

MECHANICAL- Techniques relating to valve construction, graphite machining, materials handling, and safety procedures are noteworthy, but of interest to an extremely limited field. High vacuum systems of novel construction, instrumentation, and equipment have been developed on the project, but have already become available to industry without further steps toward declassification.

No evaluation was made by the engineering group of the economic factors of the electromagnetic separation of materials, since an industrial application would involve a specific set of surrounding conditions . Should anyone in industry be interested, however, individual problems can be addressed to the USAEC, Washington, D.C., and estimates on recoveries and costs on a specific project will be furnished.

AT THE ATOMIC CITIES & CENTERS IN THE UNITED STATES...

PADUCAH, Kentucky- With the accelerated schedule under which the new uranium-235 separation plants are to be constructed at the Kentucky Ordnance Works, in McCracken County here, the peak of construction is expected to be reached by this July, according to A. A. Persson, project manager for F. H. McGraw & Co. McGraw hold a $350 million contract for this job.

This project will entail two units, for the production of uranium-235 by the gaseous diffusion process. To be called C-31 and C-33, construction will proceed on both simultaneously; however, as facilities are completed, they will be put into use. According to Kenneth A. Dunbar, who heads the USAEC's Kentucky Area Office, the C-31 unit will occupy a gross area of approximately 300,000 square feet (about 500 x 600-feet), while C-33 will be more than twice this size.

NEW PRODUCTS, PROCESSES & INSTRUMENTS...for nuclear work...

FROM THE MANUFACTURERS- Midget High Range Pocket Chamber, Model L-50. For high dosage X-ray and gamma ray measurements; full scale range of 100 r. This quartz fiber pocket chamber is 1-9/16" long, by ½" in diameter, and weighs 1/5-oz. Supplied either with a clip for pocket use; with a bead chain for neck suspension; or mounted on a special chrome plated ring for wear on the finger. National Bureau of Standards tests show a rate of 45,000 r/hr is collected with only 1 or 2% loss. Accuracy of plus or minus 5% of full scale. Leakage less than 2% of full scale during 24 hour period after exposure to 10,000 r.....High Range Pocket Charger and Reader, Model L-40 (for L-50, above). Weight, 5-oz. Mechanism mounted in a single block of plastic. Charging by built-in friction charger. Automatic switch isolates the charged system when a chamber is to be read.--Landsverk Electrometer Co., Cincinnati 31, Ohio.

Low Range Dosimeter, Model L-25. A self-reading integrating pocket meter for protection of personnel. Unit is ½" in diameter, 3½" long, and weighs 1/3-oz. Measures X-ray and gamma ray dosage in the range from 0 to 200 mr. Worn in the pocket like a fountain pen. Consists essentially of a small, highly insulated, and shock-proofed quartz fiber electrometer and a microscope with a reticle in the eyepiece for viewing the fiber. Accuracy of plus or minus 5% of full scale. Background leakage less than 2% of full scale per day.....Dosimeter Charger, Model L-20 (for L-25, above). Charger parts are mounted in interconnected sockets in a solid block of plastic. A dosimeter is charged with less than ⅛ turn of a knob. Automatic switch permits discharge of the dosimeter and charger whenever necessary.--Landsverk Electrometer Co., Cincinnati 31, Ohio.

Models C-13 and C-14 are two recently designed sub-miniature plug-in linear amplifiers for use with scintillation counters, proportional counters, ion chambers, and neutron detectors. Model C-13 is intended as a pre-amplifier to accept negative pulses of 200 millivolts or less. The broad-band feedback amplifier has an overall gain of 100 times in delivering positive pulses to the termination of a 75 ohm cable up to 150 feet in length. Model C-14, which may be used separately or in connection with C-13, accepts positive pulses up to 1 volt in amplitude. The wideband feedback amplifier has a gain of 50, and delivers negative pulses to a diode discriminator circuit. Pulse amplitude modulation is controlled by a potentiometer on the top of the unit. Both units use subminiature tubes throughout and have components potted in a plastic; they meet Navy shock test 40T9.--Radioactive Products, Inc., Detroit 26, Michigan.

EXPERIMENTAL AND DEVELOPMENT WORK- Two types of personnel badges, for detecting exposure to ionizing radiation, and developed under the Navy's Bureau of Ships sponsorship, are said to be simple, rugged, and inexpensive, and to retain their characteristics in storage and under extreme heat. One type uses transparent crystals of alkali halides which turn blue under gamma ray exposure. The other type contains a silver-activated phosphate base glass which gamma ray exposure converts to a phosphor showing orange color under ultraviolet light. In both types, the intensity of the color is said to be a measure of the quantity of dosage.

A heavy metal with a 50% greater density than lead is now being manufactured in Detroit by the Carboloy Co., Inc. Known as Hevimet, the metal has been recommended by the manufacturer for shielding against ionizing radiation.

NEW BOOKS & OTHER PUBLICATIONS...in the nuclear energy field...

The Atom at Work, by Jacob Sacks, M. D., Brookhaven National Laboratory. The development of nuclear fission from early research work to the atomic bomb. Isotopes and their manifold uses, in medicine, agriculture, industry, etc. --Ronald Press, New York, N.Y.

Atomic Energy Project Reports of the National Research Council of Canada. A listing (no.6) of seventy-two reports now available.--National Research Council, Ottawa, Canada.

ATOMIC PATENT DIGEST...latest U. S. applications & grants...

GRANTS- Apparatus for measuring the thickness of a tube wall from the inner side. Comprises an elongated cylindrical casing, a source of penetrative radiation within the casing, a cylindrical radiation detector located concentrically within the casing, and associated means. U. S. Pat. No. 2,536,131, issued Jan. 2, 1951; assigned to The Texas Co., New York.

Method of making basic ammonium uranyl sulfate and uranium oxide. The former is made by mixing an acid soluble oxidic uranium compound with sulfuric acid and ammonium sulfate and maintaining the pH of the mixture between 4 and 6. Making uranosic oxide comprises treating a hot acqueous suspension of sodium uranate with sulfuric acid and ammonium sulfate at a pH between 4.5 and 5 to form a water-insoluble basic ammonium uranyl sulfate, filtering off the liquid, and calcining the basic ammonium uranyl sulfate. U. S. Pat. No. 2,536,347, issued Jan. 2, 1951; assigned to Union Carbide and Carbon Corp., New York.

Method of preparing uranium hydride which consists of completely reacting massive uranium metal free from internal oxide in a single continuous operation at a temperature between 150 and 400 degrees C., with hydrogen, at a pressure-maintained continuously at least in excess of the partial pressure of hydrogen resulting from decomposition of uranium hydride at the reaction temperature. U. S. Pat. No. 2,536,616, issued Jan. 2, 1951; assigned to United States of America (USAEC).

Direct current negative feedback amplifier. U. S. Pat. No. 2,536,617 issued Jan. 2, 1951.....Fast impulse circuits. U. S. Pat. No. 2,536,808, issued Jan. 2, 1951.....Radiation detector. An ionization chamber. U. S. Pat. No. 2,536,991, issued Jan. 2, 1951. Note: These three patents assigned to United States of America (USAEC).

Method of manufacturing thorium. Comprises mixing a compound selected from the group consisting of the chloride, the oxychloride, and mixtures of them, with granulated distilled calcium in the proportion of about 70 parts by weight of the former to about 34 parts by weight of the latter. The mixture, in a molybdenum cup, is heated under vacuum by high frequency induction to about 1100-1200 degrees C. for about 15 minutes to melt the calcium and reduce the thorium compound to metal powder. The thorium is then recovered from the mixture. U. S. Pat. No. 2,537,067, issued Jan. 9, 1951; assigned to Westinghouse Electric Corp., E. Pittsburgh, Pa.

APPLICATION- Refractories. Four applications cover crucibles made of or lined with a sulfide of cerium, thorium, or uranium, for use in melting metals of high atomic weights. Also covered are various methods of preparing the sulfides. Apps. No. 791,466-67-68 & 69, filed Dec. 27, 1947; published Dec. 26, 1950. (L. Brewer, N. L. Lofgren, and E. D. Eastman (deceased), inventors; assigned to United States of America; USAEC)

RADIOISOTOPES...therapeutic and tracer uses...

Experiments employing radioactive phosphorous were designed by R. C. Grauer, H. S. Strickler, and others, of Singer Memorial Research Laboratory, Alleghany General Hospital, Pittsburgh, to secure increased concentration of a radioactive isotope in a target organ of the female genital tract. It was found that the preferential localization of radioactive phosphorous is enhanced in the uterus of the immature rat by the administration of estradiol. That the phosphorous-32 becomes bound in the estradiol primed uterus was evidenced by the increase of P-32 in the acid insoluble fraction. The liver was not influenced in this process, indicating that the proliferating cells in a hormone treated target organ influence the uptake of P-32. The investigators believe that the data obtained in the experiment indicate a suggested approach to the treatment of genital malignancies.

A project designed to prepare sugars and other carbohydrates with radioactive carbon atoms located in specific positions within the molecule has begun at the National Bureau of Standards, Washington, D.C. These sugars in turn can be used to make labeled samples of other carbohydrates such as starch or cellulose. The program, sponsored by the USAEC, was initiated to meet the increasing need for carbohydrates that can be traced through the processes of living cells. The labeled sugars prepared at the Bureau will have particular application in an investigation of the synthesis of labeled cellulose initiated by Glenn A. Greathouse, of the National Research Council.

RAW MATERIALS...radioactive ores & other materials for nuclear work...

UNITED STATES- Salt Lake City, Utah: Vitro Manufacturing Co., of Pittsburgh, Pa., who have now acquired the Salt Lake alunite plant from J. R. Simplot, of Boise, Idaho, will utilize the plant, after its rehabilitation, to refine uranium ores and other chemical specialties. This marks further expansion for Vitro, large U. S. uranium refiner, which last year acquired Kellex Corp., one of the principal engineering firms in the field of nuclear energy (AEN 7/4/50, p.1).

UNION OF SOUTH AFRICA- West Rand Consolidated Mines, Ltd., have now disclosed that by an arrangement with the Atomic Energy Board of South Africa it will erect a plant for the extraction of uranium from the gold residue slimes of the 40,000-ton monthly capacity of its West Reduction Plant, now under construction. (West Rand is one of the four companies initially to participate in the Union's plans to recover uranium from gold tailings; Great Britain and the U. S. will exclusively receive the uranium so recovered- AEN: 12/19/50, p.1).

This plant will be used for the treatment of ore mined from the Bird Reef series, an ore body which contains uranium considerably in excess of the contents of the other reefs in the mine. It is estimated that the plant will be ready for operation in the latter part of 1952. The contract with the Board will be for the sale of uranium over a period of ten years from the time the plant is in full production. The price to be paid for the uranium will be related to the cost of production on a basis which will ensure the redemption of the capital cost of the plant, plus interest, over the ten year period of production, and should provide a reasonable margin of profit to the company on the capital invested. Arrangements have been made through the Atomic Energy Board to enable the company to obtain a loan of the entire capital cost of the plant, such loan being repayable during the 10-year production period. The company will also pay to the State a proportion of its profits from uranium at the same rate applicable to the profits obtained from mining for gold.

IONIZING RADIATION...investigations & notes...

Radiation effects on plant hormones have been under investigation by an Argonne National Laboratory research team headed by Solon Gordon. An improved method was developed for measuring extremely small amounts of auxin, the plant hormone. This method, together with biological assay, was used to study formation of auxin in living plant tissue as related to varying amounts of radiation from X-rays. As a result of these experiments, performed on kidney bean, cocklebur, celery cabbage, and young oat plants, it was concluded that auxin itself is not unduly sensitive to radiation, and that growth by cellular elongation is not affected by low radiation doses. It was also concluded that part of the damage to plant growth occurs because radiation affects the formation of auxin within the plant. (In other studies at Argonne, auxin--which is chiefly indoleacetic acid--has been tagged with radiocarbon to determine the exact biochemical location in a plant where the growth hormone functions.)

In the course of an investigation of the pathologic effects of ionizing radiation upon the development of the mammalian nervous system (conducted by S. P. Hicks, Dep't. of Pathology, Pondville Hospital, Walpole, Mass.), it was found that growing central nervous tissue in fetal rats and mice could be selectively and extensively destroyed by X-irradiation with virtually no destructive effect on other organs. Irradiation of pregnant rats and mice, with 200 to 600 r to the whole body, resulted in acute necrosis of the rapidly growing parts of the brain, spinal cord, and retinas of their fetuses. This developed within a few hours, was highly selective for the central nervous system, and was often severe and extensive at 200 to 600 r. At 150 r, damage was less, and was followed in two days by malformation in the neuroplastic zones. Extra neural lesions were absent below 200 r. Below 100 r, no destructive lesions occurred.

Sincerely,

The Staff,
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